4. ALTERNATIVES

4.1. PLANS ELIMINATED FROM FURTHER STUDY

4.1.1. Lock Locations

4.1.1.1. Alternative locations for a replacement lock at Bayou Sorrel are limited by the proximity of the community of Bayou Sorrel and the alignments of existing waterways and the EABPL. South of the existing lock, a new lock and channel could be constructed to bring navigation traffic along the east side of the existing lock. However, the alignment of the connecting channel would pose navigation problems, especially where the new channel would intersect Lower Grand River. Also, for this alignment, long connecting channels would have to be dredged through bottomland hardwood forest and cypress swamp, thus producing significant adverse impacts and requiring substantial mitigation. State Highway 75 would also likely have to be realigned. For these reasons, this alignment was eliminated from further study.

4.1.1.2. The Bayou Sorrel community lies about one and one-half miles north of the Bayou Sorrel lock. For socioeconomic reasons, no alignment that would directly affect the community of Bayou Sorrel was considered. Farther north lies extensive areas of bottomland hardwood forest and cypress swamp. Some local residents have suggested that the new lock be built north of Bayou Sorrel so that the re-aligned navigation channel would bypass the Bayou Sorrel bridge. Upon evaluation of potential alignments north of Bayou Sorrel, it was quickly noted that the East Access Channel and the GIWW diverge at 90-degree angles, making any navigation alignment between these waterways problematic. Any alignment to the north of Bayou Sorrel would require dredging miles of new channel through bottomland hardwood forest and cypress swamp, causing significant adverse impacts to the environment of the area. For these reasons, no alternative locations to the north of the existing lock were investigated in detail.

4.1.1.3. A number of minor variations to the proposed lock alignment and location were investigated. The important considerations were the proximity of the EABPL and the original construction site for the existing lock. That construction site was abandoned due to soil stability problems, which had caused an excavation failure. The siting of the new lock has been adjusted to avoid the location of the soil failure to the maximum extent practicable, so as to avoid problems during construction of the new lock. However, the original construction site cannot be totally avoided, so engineering controls have been incorporated into the construction plan to account for the poor soil conditions.

4.1.1.4. The fairly narrow distance between the EABPL and the GIWW channel north of the existing lock, coupled with the old excavation failure site, required considerable engineering work to develop a safe, cost-effective alignment. The variations in the alignment of the proposed lock and channels have been evaluated in this final EIS and are described in the Main Report and in greater detail in the Engineering Appendix.

4.1.2. Connecting Channels

Early in this study, the south entrance channel to the new lock was aligned with consideration only to provide the minimal curves necessary for safe navigation. During review of the proposal by personnel familiar with the operation of the existing lock and the needs of the navigation industry, it was noted that barge tows have serious problems entering the existing lock from the south during high river stages and/or high crosswind conditions. The main problem is insufficient distance between the swift flowing water in the East Access Channel and the guide-wall leading into the lock. The south guide-wall has sustained major damage on numerous occasions, and the entire guide-wall had to be replaced in 1998-99. The required alignment for the south entrance channel of the new lock would have created an unsafe condition, similar to the situation at the existing lock. The solution to this problem is to realign the East Access Channel to the west, effectively separating the currents in the East Access Channel from the barge tows entering the lock. This proposed realignment creates a longer, slack water entrance channel so that barge tows can align themselves with the guidewall before they reach it.

4.1.3. Lock Size and Type

4.1.3.1. Locks of various sizes were studied early during the feasibility study. Benefit-cost ratios developed during the reconnaissance study were used to develop a study-streamlining proposal that was submitted to the USACE, Mississippi Valley Division for approval in 1996. Part of the proposal was to forego studying various chamber lengths and select a 1,200-foot chamber length as the optimal length. The Mississippi Valley Division concurred with the proposal, so only 1,200-foot long locks have been evaluated in detail for this study. Chamber widths of 75 feet and 110 feet have been evaluated. These widths are the same as other locks on the GIWW. Standard size barges are usually 35 feet wide, although 50-foot wide barges are also common. Seventy-five foot wide locks could accommodate two 35-foot barge tows side by side or one 50-foot wide barge tow. One hundred and ten-foot wide locks could accommodate up to three barge tows that are 35 feet wide each or one 35-foot wide tow and one 50-foot wide tow.

4.1.3.2. Only sector-gated locks were investigated. This is the normal type of lock used in situations where relatively low head differentials (differences in water levels) are encountered. Both concrete-chambered locks and earthen-chambered locks were studied. Concrete-chambered locks are normally more costly than earthen-chamber locks, but are more efficient since their cycling time is shorter. This is because the chamber size is much smaller on the concrete-chambered locks, which reduces the filling and emptying times. The filling and emptying times of the earthen-chambered locks increase significantly during high water periods since the entire earthen-chamber must be filled and emptied during a lock cycle. During low water periods, only the center of the earthen-chamber is inundated, whereas the entire chamber fills with water during high water periods.

4.2. NO ACTION/WITHOUT PROJECT CONDITIONS

4.2.1. Without a new Bayou Sorrel lock, navigation traffic on the GIWW, Morgan City to Port Allen Alternate Route, would continue to experience delays transiting through the Bayou Sorrel lock due to inadequate lock capacity. Barge tows would continue to wait in the vicinity of the existing lock, pushed up against the banks of the waterway, often in close proximity to residences. Occasional high water occurrences in Lower Grand River and the GIWW, outside of the Atchafalaya Basin Floodway, would require navigation traffic to operate under one-way and no wake conditions. Under extreme high water conditions, the GIWW Alternate Route would be shut down to navigation traffic to protect residences and other properties.

4.2.2. The Bayou Sorrel lock serves the dual purpose of navigation and flood control. Since the lock was constructed in 1952, siltation in the Atchafalaya Basin Floodway has reduced the ability of the floodway to pass water. As a result, the height of the floodwaters (flow-line) for the project flood has increased. At present, the lock cannot safely withstand a project flood on the Atchafalaya Basin, Louisiana, project. Water would overtop the structure. If no action is taken to replace the Bayou Sorrel lock, emergency actions, such as sandbagging and piling-up fill material on the existing lock structure, would be necessary in the event of a major flood event. Such flood fighting measures would exert damaging loads on the lock structure, and likely cause permanent damage to the lock. However, in the event of a project flood, the prevention of flooding would take precedence over the viability of the lock structure.

4.3. PLANS CONSIDERED IN DETAIL

4.3.1. General

Preliminary investigations determined that only one reasonable location for a new lock exists. That location is just to the north and west of the existing lock. There have been some variations investigated for the exact position, alignment, and construction method of the new lock, but these minor variations would all produce similar environmental effects, since the area of direct construction impacts would be essentially the same.

4.3.2. No Action

In the absence of a new lock, the existing lock and waterway would continue operating. Navigation delays would continue at the Bayou Sorrel lock, especially during moderate to high water periods when the head differential between the two sides of the lock causes longer locking times. Annual maintenance dredging would occur just south of the lock at the intersection of the East Access Channel and the GIWW. The dredged material would be placed along the west bank of the East Access Channel in confined disposal areas. New disposal areas would have to be developed over time as existing disposal areas reach their capacity.

If a project flood occurs, emergency efforts to prevent overtopping of the existing lock would be undertaken to reduce or eliminate overtopping of the lock structure by floodwaters. Such efforts would likely cause permanent damage to the lock. Permanent modifications to the existing lock to contain a project flood are not possible due to the inadequate foundation beneath the existing lock.

4.3.3. Plan 1 – Float-in Floodgate for Flood Control

If a new lock is not constructed for navigation purposes, a floodgate would need to be constructed to prevent the overtopping of the existing lock during a project flood in the Atchafalaya Basin, Louisiana, project. A float-in, sector-gated structure that would provide flood protection in front of the existing lock was investigated. The float-in design is necessary for this alternative so that lock down time during construction would be minimized. The designed structure consists of a pile-founded, post-tensioned and reinforced concrete, sector gated monolith with the floor set at elevation -15.0 feet National Geodetic Vertical Datum (NGVD) and the top of walls set at elevation +31.7 NGVD. The monolith would house the sector gates and machinery that would provide the same 56-foot wide opening for tows as the existing lock. The structure would be constructed at an adjacent graving site surrounded by an earthen cofferdam to provide flood protection during construction. Upon completion, the cofferdam would be breached to allow the structure to be floated out and positioned above its foundation. Once lowered into place, the pile foundation would be grouted to the structure's concrete base. To keep the tows aligned, the existing guide wall would be extended between the existing lock and the new structure. A new composite timber-faced guide wall and sheet pile dolphin would be constructed on the approach to the new structure. To complete the line of flood protection, approximately 240 linear feet of pile-supported reinforced concrete T-wall and I-wall would be constructed to tie into the existing EABPL. All costs of this alternative would be borne by the MR&T project at 100 percent Federal cost, as there would be no quantifiable navigation benefits of this proposal.

4.3.4. Plan 2 – In-Kind Replacement Lock for Flood Control

4.3.4.1. If a new lock were not constructed for navigation purposes, a replacement lock would need to be constructed to safely pass a project flood in the Atchafalaya Basin, Louisiana, project. If a project flood were to occur with the existing lock in place, emergency efforts would be undertaken to prevent overtopping of the lock. Such efforts would likely cause permanent damage to the lock. Permanent modifications to the existing lock to contain a project flood are not possible due to the inadequate foundation beneath the existing lock.

4.3.4.2. The lock constructed under this plan would be a sector-gated, earthen chamber lock with the same usable inside dimensions as the existing lock (56 feet wide by 797 feet long by 14 feet deep). It would be constructed just to the north and west of the existing lock and east of the East Atchafalaya Basin Protection Levee. All costs of this alternative would be borne by the MR&T project at 100 Federal cost, as there would be no quantifiable navigation benefits of this proposal.

4.3.4.3. The physical features of this plan are essentially the same as for the sector-gated locks described for Plan 3, described in the following section. Hence, the direct environmental impacts, or footprint, of this plan would be the same as for Plan 3.

4.3.5. Plan 3 – New Lock for Navigation and Flood Control

4.3.5.1. This primary alternative involves six secondary alternative lock sizes and designs. The secondary alternatives are:

Plan 3A	1,200 x 75 x 15 foot, earthen chamber lock
Plan 3B	1,200 x 75 x 15 foot, earthen chamber lock with drains
Plan 3C	1,200 x 75 x 15 foot, concrete chamber lock
Plan 3D	1,200 x 100 x 15 foot, earthen chamber lock
Plan 3E	1,200 x 110 x 15 foot, earthen chamber lock with drains
Plan 3F	1,200 x 110 x 15 foot, concrete chamber lock

4.3.5.2. All of the plans above would be built at approximately the same location and would be aligned similarly. The location and alignment of any replacement lock is constrained by the existing lock, an old excavation soil failure, and the EABPL. The proposed site, which avoids the old excavation site (except for part of the north guidewall), is the only site that will be discussed in detail.

4.3.5.3. The earthen chamber alternatives include a T-wall constructed on new levee fill. A T-wall on a new levee was chosen since a full levee section would extend into the existing channel. The levee fill will cause significant settlement of the T-wall and additional loading on the piles from negative skin friction. Multiple lift construction of the levee is not possible since the settlement will take years and must be eliminated before the T-wall is constructed. Two procedures were investigated to minimize the settlement of the new levee fill. One method involves preloading the site for two years with no other construction activity (Plans 3A and 3B). The other method would be to preload with wick drains for one year while excavation and construction of the gate bays proceed (Plans 3B and 3E). The advantage of the wick drains is that settlement will occur in a maximum of one year reducing the time of construction. Circular sheet pile cells would be constructed, tying in the gate bays with the earth chamber T-wall for the wick drain alternative. The circular sheet pile cells would provide cofferdam support during excavation for the gate bays and would remain in place as permanent protection. The circular sheet pile cells would also eliminate the need to preload the area next to the gate bays. The preload with wick drains during excavation of the gate bays would also require some geotextile reinforcement to maintain an acceptable factor of safety for stability into the excavation. For either preloading alternative a portion of the flood-side levee toe of the earth chamber levee with T-wall will encroach on the existing channel at the northern side of the new lock. Rock will be placed in the existing channel and clay fill levee will be constructed above the water surface on the rock base. Constructing the gate bays concurrent with preloading will be more expensive because of the wick drains, circular sheet pile cells, geotextile, additional rock and complexity of construction.

4.3.5.4. The following is a description of the concrete-chambered alternatives (Plans 3C and 3F). Lock chamber monoliths would enclose the lock between the upper and lower gate bay monoliths. The proposed lock chamber is designed to be constructed with 27 each – 40 foot monoliths, that in conjunction with the gate bay monoliths, would provide a chamber either 75 or 110 feet wide by 1200 feet long (useable length). All of the chamber monoliths would be pile-supported, reinforced concrete U-frame structures of uniform cross section. Each monolith would be designed independently to support any lateral earth pressure or hydrostatic loads. To prevent concrete damage the lock chamber would be protected with wall armor and corner protection where applicable. The proposed gate bay monoliths located at each end of the lock would be designed to house the sector gates and the machinery used to actuate the gates. The sector-type gates would be all welded structural steel construction. The gate bay and lock chamber floor would be set at -15.0 feet NGVD, with the south top of wall set at +31.7 feet NGVD and the north top of wall set at +26.8 feet NGVD. The monolith would allow the gates to be recessed flush with the face of the lock wall when in the open position. Slots would be provided upstream and downstream of the sector gates to allow for emergency and maintenance dewatering by installing bulkheads. To prevent concrete damage the gate bay monolith would also be protected with wall armor and corner protection where applicable. Parallel guide walls, to guide the barge tows into the lock and to provide mooring facilities, would be provided at each end of the lock. The guide walls would be composed of braced pile bents faced with horizontal composite marine timber wales. The west guidewalls, at both ends of the lock, would be 1200 feet long, while the east guidewalls would be 400 feet long. Pile supported, steel sheet pile, concrete filled dolphins would be provided at the end of each timber guide wall. Reinforced concrete T-walls and I-walls would connect the gate bay monolith to the EABPL west of the new lock. T-walls and I-walls east of the new lock would connect the gate bay monolith to a new levee that ties into the closure provided across the existing lock. The T-walls would be supported on pre-stressed concrete piling, and the I-wall would be supported by Z-shaped sheet piling. New earthen levees would be constructed to connect concrete T-Walls and I-walls to the lock closure and connect the lock closure to the existing EABPL. An earthen closure dam at +33.0 feet NGVD would close the existing lock earthen chamber, after completion of the replacement lock.

4.3.5.5. All of the lock replacement alternatives would be constructed on Government owned property and on adjacent lands over which the government has perpetual maintenance dredging disposal easements and channel easements. Two new channels would be excavated to connect the new lock with the GIWW, Morgan City to Port Allen Alternate Route to the north and south. The forebay channel will connect the new lock with the alternate route channel to the south through a land cut 5,000 feet in length. The new lock tailbay channel will connect the new lock to the existing alternate route channel to the north through a land cut 3,250 feet long. The design for the connecting channels will require dredging a channel with a bottom width of 125 feet and elevation -12 feet Mean Low Gulf (MLG) or -12.8 feet NGVD. The channel will have side slopes of 1 vertical on 3 horizontal from the bottom to the top of ground. Another channel would be dredged to re-route the East Access Channel further west. That channel would be through a new land cut 6,000 feet long over currently held government disposal area. The design for the

connecting East Access Channel will require dredging a channel with a bottom width of 80 feet and elevation -7 feet MLG (-7.8 NGVD). The channel will have side slopes of 1 vertical on 3 horizontal from the bottom to the top of ground. The channel right-of-way is 500-feet wide for both connecting channels and east access channel.

4.3.5.6. The required disposal areas cover lands currently held as perpetual easements for the deposit of maintenance dredging material or previously used levee construction borrow pit areas. Approximately 2,320,000 cubic yards of soil will be removed from the new lock forebay and tailbay channels and the new east access channel. The approximately 490,000 cubic yards excavated for the new lock tailbay channel will be placed in borrow pits located about 1 mile east of the lock site along the Lower Grand River. Excavation of approximately 750,000 cubic yards for the new lock forebay channel will be placed on portions of lands currently used for the deposit of maintenance dredging material. The new lock would then become operational. Approximately 1,080,000 cubic yards of soil will be removed from existing dredged material disposal areas for construction of the new East Access Channel. This material will be placed as an earthen closure of the existing GIWW Morgan City to Port Allen Alternate Route. The closed areas of the existing channels, including the existing lock chamber, will provide disposal areas for construction and future maintenance dredging requirements. Excavation for all three channels will be performed with cutterhead pipeline dredges discharging to confined disposal areas. Effluent will be returned to the GIWW for the new lock forebay channel and to the Lower Grand River for the tailbay channel. A detailed description of the construction sequence for the new lock is located near the end of the Engineering Appendix.

4.3.6. Supplemental Features of the Recommended Plan as a Result of Public Meeting on Draft EIS

4.3.6.1. General

The major concern voiced during public review of the draft report and EIS was the bank erosion occurring along the GIWW, north of the Bayou Sorrel lock. Erosion protection between the new lock and the Bayou Sorrel bridge was part of the plan recommended in the draft report and EIS. As a result of the public comments, erosion protection for both banks of the GIWW, north of the Bayou Sorrel lock for a distance of about one-half mile has been added as a feature of the recommended plan. Mooring buoys for tows have also been added to provide a place for tows to park while waiting to transit the new lock.

4.3.6.2. Erosion Protection above the Bayou Sorrel Bridge

4.3.6.2.1. *Bank Stabilization Analysis.* Bank stabilization from the new lock to approximately one-half mile north of the Bayou Sorrel bridge was analyzed for both banks of the channel. Hydraulic analysis required a minimum 2-foot blanket of stone from the water's edge to the –8.0 NGVD contour to protect against the most severe wave damage resulting from prop-wash. Analysis indicated that stone protection to the top of the bank would be required to assure

complete protection of the bankline, including the upper part of the bank during high water stages.

4.3.6.2.2. *Bank Stabilization Alternatives*. Three separate alternative designs were considered. Geotextile separator fabric was recommended for all design alternatives. The alternatives were evaluated in terms of the primary purpose of bank protection, the existing channel width, the need for mooring buoys along the west bank within this reach, the impact on navigation, and the resulting cost. Bank protection Alternative 1 consisted of a rock dike centered approximately at the 0.0 NGVD contour. This alternative required more rock per linear foot than the other alternatives, resulting in a higher cost, and the dike configuration was the least desirable alternative from the prospective of the navigation community, as it reduced the existing channel dimensions. Bank protection Alternative 2 consisted of dredging the underwater banklines and placing a two foot layer of rock paving from the top of the bank to the –8.0 NGVD contour. Dredging of the underwater bankline resulted in multiple benefits: It provided a viable mooring area and allowed placement of floating mooring buoys; it resulted in a smaller stone quality to achieve placement to the –8.0 NGVD contour; and the bank dressing assures better coverage during the underwater bank paving operation. Bank protection Alternative 3 is similar to Alternative 2 except that it does not include the subsurface bank grading along the east bank of the channel where mooring buoys are not proposed. This alternative does not significantly reduce the quantity of rock compared to Alternative 2, but it does decrease the cost of excavating and transporting dredged material for disposal south of the Bayou Sorrel bridge. Alternative 3 is the selected alternative for erosion protection.

4.3.6.3. Mooring Buoy Facility

The type of mooring facility and the location of these facilities was determined based on recommendations from New Orleans District, Operations Division. An alternative consisting of a timber pile or composite material mooring facility was investigated, along with a floating mooring buoy system. The use of a timber or composite material mooring facility was not selected because of the history of damage associated with the use of this type of mooring facility in the vicinity of the existing Bayou Sorrel lock. Another factor was that the mooring area north of the Bayou Sorrel Bridge was not close enough to the lock to allow for monitoring and or determination of damage to a timber or composite material mooring facility. The preferred alternative is a floating mooring buoy facility to include 27 buoys. The locations will include 14 mooring buoys in the vicinity of the new lock, and 13 mooring buoys north of the Bayou Sorrel bridge. In order to place the 13 mooring buoys north of the Bayou Sorrel bridge, approximately 22,500 cubic yards of material will be dredged from the river to provide a minimum water depth of 9 feet, and will coincide with the bank dredging needed for the rock placement. The dredged material will be used for random backfill on the new lock grounds.

4.3.7. Economic Comparison of Plans Considered

The economic attributes of the various size locks evaluated for this study are shown in Table 2. The in-kind replacement lock is shown as the basis for comparison for the lock replacement plans.

TABLE 2 - ECONOMIC COMPARISON OF ALTERNATIVES

Plan	Construction Cost ($) (2000 prices)	Net Annual Benefits (above Plan 2) (adjusted to 2008[1]) ($)	Benefit/cost Ratio (above Plan 2)	Base Year[2]
Plan 1 - Float-in Floodgate	25,895,097[3]	N/A	N/A	N/A
Plan 2 – In-kind Replacement	63,531,513	N/A	N/A	N/A
Plan 3A - 1,200x75x15 Earthen	75,578,514	12,965,307	14.5	Mid 2010
Plan 3B - 1,200x75x15 Earthen w/Drains	84,751,419	12,991,373	5.9	Mid 2008
Plan 3C - 1,200x75x15 Concrete (Recommended Plan)	68,385,672	15,322,870	16.7	2008
Plan 3D - 1,200x110x15 Earthen	79,112,598	13,225,871	13.1	Mid 2010
Plan 3E - 1,200x110x15 Earthen with Drains	88,156,254	13,330,308	5.8	Mid 2008
Plan 3F - 1,200x110x15 Concrete	75,374,698	15,086,523	11.2	2008

[1] Benefits are adjusted to 2008 to compare all alternatives on an equal basis.
[2] The base year is the year when benefits begin to accrue, or in other words, the year the project begins to operate.
[3] The total cost of Plan 1 also includes costs to navigation of $32,040,000 due a required 60-day closure.

4.3.8. National Economic Development Plan

The National Economic Development (NED) plan is defined as the plan that produces the greatest net economic benefits. The USACE District responsible for the study normally recommends the NED plan, unless there are compelling reasons why a different plan should be recommended. In this study, Plan 3C has been identified as the NED plan since it produces the greatest economic benefits, and Plan 3C is the recommended plan.

4.3.9. Locally Preferred Plan

4.3.9.1. In USACE civil works studies, a non-Federal sponsor is required to share the cost of the feasibility study and project construction. In most cases, the non-Federal sponsor is state or local government agency, levee board, or port authority. Inland waterway navigation studies and projects are different, in that the non-Federal share of the funds required to study and construct such projects comes from the Inland Waterway Trust Fund. A tax on fuel used by inland waterway navigation interests provides the money in the trust fund. The Inland Waterways Users

Board (IWUB), comprised of appointed navigation interests, makes recommendations to the head of the Mississippi River Commission as to how available funds should be spent. The head of the Mississippi River Commission makes the final decision on the expenditure of trust fund money. There has been no priority category established by the IWUB for replacement of the Bayou Sorrel lock.

4.3.9.2. The flood control portions of this project are part of the Atchafalaya Basin, Louisiana, project under the comprehensive Flood Control, Mississippi River and Tributaries project, authorized by the Flood Control Act of 1928, as amended. Pursuant to the cost sharing provision of the Flood Control Act of 1928, as amended, as applicable to this project, no local contribution is required for the flood control portion of this project.

4.3.9.3. Iberville Parish officials indicate that they would be in favor of a new lock at Bayou Sorrel, as long as local residents are not adversely affected by bridge outages or increased bank erosion. Additional information on local government and residents' views is contained in the Public Meeting, Comments, and Responses Appendix

4.3.10. Environmentally Preferred Plan

From solely an environmental perspective, Plan 1 (the float-in floodgate) would produce the least environmental impacts. There is no significant difference in the environmental impact of Plans 2 and Plans 3A through 3F. It is not reasonable to designate any one of those plans as being more environmentally preferred over another.

4.3.11. Recommended Plan

Plan 3C, which provides for a new 75-foot wide by 1,200-foot long by 15-foot deep, concrete-chambered lock, is the recommended plan. Plan 3C is chosen because it produces the greatest net benefits. Plan 3C also has a mitigation plan to compensate for unavoidable environmental impacts.

4.4. COMPARATIVE IMPACTS OF ALTERNATIVES SUMMARY

Table 3 provides a summary of the impacts on significant resources associated with investigated alternatives. Plans 2 and 3A through 3F affect essentially the same location or area, so they are grouped together. A description of each significant resource and a more detailed analysis of the impacts are contained in Section 5, Affected Environment/Environmental Effects.

TABLE 3
SUMMARY OF IMPACTS TO SIGNIFICANT RESOURCES

Significant Resource	Existing Condition and No-action	Plan 1 – Float-in Floodgate	Plans 2 and 3A through 3E – Lock Replacement Plans
Waterborne Transportation	The Bayou Sorrel lock causes considerable delays to navigation traffic.	This plan would not provide navigation improvements.	Any of these plans, except for Plan 2, would provide substantial navigation improvements.
Flood Protection Systems	The Bayou Sorrel lock is not adequate to protect against a project flood in the Atchafalaya Basin, Louisiana, project.	This plan would provide adequate protection from a project flood in the Atchafalaya Basin, Louisiana, project.	Any of these plans would provide adequate protection from a project flood in the Atchafalaya Basin, Louisiana, project.
Socioeconomic Resources	The Bayou Sorrel community is typical of rural southern Louisiana communities.	No effects on socioeconomic resources are expected.	No substantial effects on socioeconomic resources are expected. Five residences would have to be relocated.
Noise	Noise levels in the Bayou Sorrel area are generally low due to its rural setting. Navigation traffic in close proximity to some residences causes problems.	No noise impacts are expected since the floodgate construction is far from any populated areas. Otherwise, same as No Action.	Lock and channel construction is not expected to cause noise problems due to the distance from populated areas. Otherwise, same as No Action.
Air Quality	Iberville Parish is a "serious non-attainment" area for ozone. Problems stem at least partly from chemical plants and vehicle emissions.	The emission estimate for this plan is below the threshold level set under the State Implementation Plan. No conformity determination is required.	The emission estimates for these plans are below the threshold level set under the State Implementation Plan. No conformity determination is required.
Bottomland Hardwood Forest (BHF) and Cypress Swamp (CS)	Nearly all of the undeveloped land in the vicinity of Bayou Sorrel is bottomland hardwood forest and cypress swamp.	This plan would impact a total of 23.3 BHF (mostly dredged material disposal areas). No mitigation is proposed.	The project would impact about 240.4 acres of BHF (mostly dredged material disposal areas). Avoidance compensatory mitigation would replace lost habitats.
Aquatic Habitats	Aquatic habitats in the area are extensive and highly productive for recreational and commercial fisheries.	Less than one acre of aquatic habitat would be permanently lost.	The project would convert 52 acres of borrow pits (aquatic habitat) to forest, 80.5 acres of channels to forest, and 88.9 acres of forest to channels.
Threatened and Endangered Species	Bald eagles forage in the area. Louisiana black bear and pallid sturgeon may occur in the area.	The project is not expected to adversely affect listed species or their critical habitats.	The project is not expected to adversely affect listed species or their critical habitats.
Recreation	Fishing and hunting are, by far, the two most important outdoor activities in the area.	No adverse effect on recreational activities is anticipated.	Some fishing activities may be displaced during construction. Hunting on areas affected by the project would be impacted. No long-term adverse effects on fisheries anticipated.
Cultural Resources including National Register Listings	There are no significant archeological sites or standing structures in the project area except for the Bayou Sorrel lock, which has been determined eligible for the National Register.	The Bayou Sorrel lock is eligible for the National Register. It would not be affected by this plan.	The Bayou Sorrel lock is eligible for the National Register. As mitigation for its dismantling, it would be documented to the standards of the Historic American Engineering Record.